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AXIOMS, EQUATIONS, AND PROBLEM SOLVING, LEARNING ACTIVITY PACKAGE NO. 3, ALGEBRA I.

BY- GLENN, EUEL
HUGHSON UNION HIGH SCHOOL, CALIF.

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THIS LEARNING ACTIVITY PACKAGE (LAP) IS DESIGNED TO GUIDE STUDENTS IN LEARNING HOW TO USE AXIOMS, IN WRITING PROBLEMS INTO EQUATION FORM, AND IN SOLVING EQUATIONS. IN ORDER TO ATTAIN THESE GOALS, THE STUDENT AT SOME POINT IN HIS PROGRAM MUST BE ABLE TO (1) WRITE A DEFINITION OF "AXIOM", (2) USE THE AXIOMS OF A FIELD IN SOLVING EQUATIONS, (3) TRANSFORM A WRITTEN PROBLEM INTO AN ALGEBRAIC "SENTENCE" AND USE THE FIELD PROPERTIES TO SOLVE THE RESULTING EQUATION, AND (4) SOLVE EQUATIONS WITH A VARIABLE IN BOTH MEMBERS. PERIODIC CHECKPOINTS ARE BUILT INTO THE SYSTEM TO ENABLE THE ACCELERATED STUDENT TO BY-PASS FAMILIAR ASSIGNMENTS AND TO ENABLE THE SLOWER STUDENT TO CORRECT DEFICIENCIES. (RP)

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Algebra I.

L. A. P.

Learning Activity Package

#3

AXIOMS, EQUATIONS, AND PROBLEM SOLVING

SE 004 450

Average Completion Time:_____

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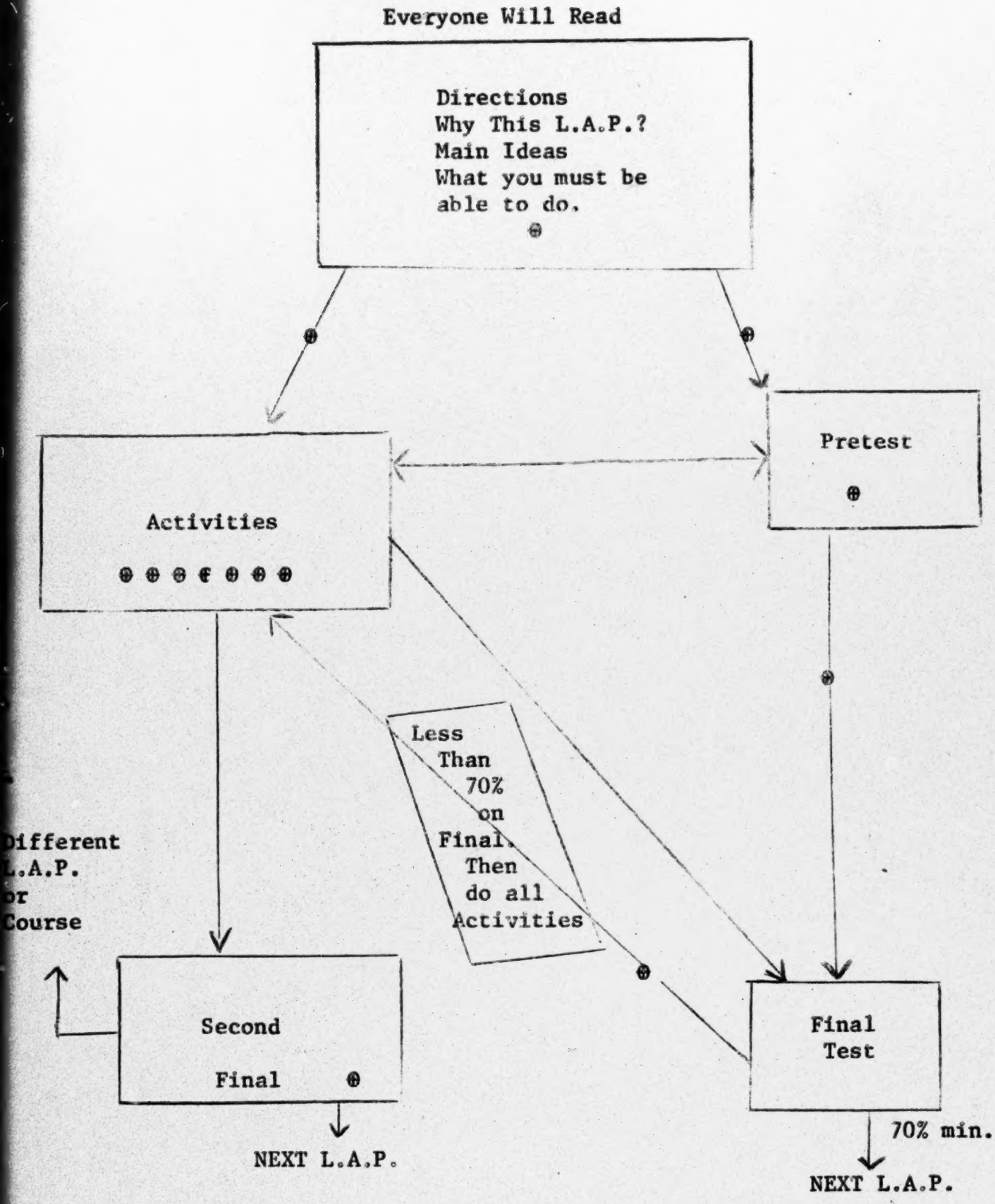
Flow Chart



⊕ Teacher Contact Points

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Axioms, Equations and Problem Solving

In this L.A.P. you are going to learn how to use axioms, how to solve equations and how to write words of a problem into equation form and solve.

NEXT PAGE PLEASE. . .

The main ideas you should learn from this L.A.P. are:

1. How to identify and use number axioms.

2. How to transform equations with Equality Properties. (How to solve equations.)

3. How to solve written problems by putting the information in the problem into an equation and solve the equation.

NEXT PAGE PLEASE . . .

In order to attain the goal (learn the main ideas) you must be able to:

1. Write a definition of "axiom".

2. Write a definition of and use in solving equations the following:

   a. The Symmetric Property of equality

   b. The Closure Properties

   c. The Substitution Principle

   d. Commutative and Associative Properties

   e. The Distributive Property: Special Properties of 1 and 0

   f. Use the addition, subtraction, multiplication and division properties of equality.

   g. Combine terms and use the Transformation Principles

3. Read a written problem and put the data in an algebraic "sentence" and then use all principles in #2 above to solve the equation.

4. Solve equations having a variable in both members.

NEXT PAGE PLEASE . . .

Now that you have considered carefully what you must be able to do, if you think you can do it turn to page 98 in "Text" and solve all 19 problems on 98, 99, and 100 in your "Text." When you finish check your answers on page 577 in "ansbk." If you have 4 or fewer incorrect answers, turn to page 6. If you have more than 4 incorrect answers, turn to page 5 in L.A.P. 3.

OR

After careful consideration you may feel you need to get some experience before taking the chapter test on page 98 in "Text"; if so, turn to page 5 in L.A.P. 3.

The reason you are on this page is that you elected not to take the Pre-test at this time or you made more than 4 mistakes on the Pre-test. In either case you are now ready to gain valuable experience and skills that will enable you to do well on the Pre-test and Final Test.

We have several activities set up that will aid you in gaining the experience and skills you need, but you need not follow them in sequence. You may have some activity that we have not considered that would enable you to do great on the Final Test. Please see your teacher and arrange to do your activity.

Remember this L.A.P. is for <u>you</u>!

Turn to page 7 in L.A.P. 3 and begin activities.

You did the chapter test on pages 98, 99, and 100 in "Text" and you missed 4 or fewer. You are doing great!

You may now see the teacher and arrange for the Final Test. If you would like to look over the problems on the chapter test that you "bungled" and solve them correctly (you may ask the teacher for help) before taking the Final Test, that will be fine.

Don't take the Final Test untill "you" are ready.

Required Activity #1:

1. On page 69 and 70 in "Text" read "Axioms of Equality".

and if needed

2. Attend a discussion session with the teacher on "Axioms of Equality".

When you finish one or both of the above,

turn to page 8 in L.A.P. 3.

Now do the 8 oral exercises on page 70 in "Text." Check your answers on green page___ in L.A.P. 3. When you finish checking, turn to page 9 in L.A.P. 3.

You got 6 of the 8 problems correct on page 70 in "Text," great! Go to page 10 in L.A.P. 3.

What? You missed more than 2 of the 8 problems on page 70 in "Text?" You need help.

1. Sign up for a small group discussion on oral exercises on page 70 in "Text."

and/or

2. Go back and read page 69 in "Text" again.

and/or

3. Ask the teacher for an explanation.

When you can do the oral exercises on page 70 in "Text," turn to page 10 in L.A.P. 3.

The worst thing you can do in algebra is to do nothing!

Required Activity #2:

Read the bottom of page 70 through 71 and the top of page 72 in "Text." "The Closure Properties". If you need help you may ask for it.

When you finish reading pages 70, 71 and 72 in "Text" do the oral exercises in "Text" page 72. Check your answers in green page 37 in L.A.P. 3. When you have checked your answers, turn to page 11 in L.A.P. 3.

You answered all the oral exercises on page 72 in "Text" correctly except 4. You're doing Okay, so solve correctly the questions you answered incorrectly and then turn to "lucky" page 13 in L.A.P. 3.

You need some help if you missed more than 4 of the oral exercises on page 72 in "Text," so kindly turn to page 12 in L.A.P. 3.

You missed more than 4 of the oral exercises on page 72 in "Text." Now:

1. Sign up for a small group discussion on oral exercises, page 72 in "Text."

and/or

2. Ask the teacher for help.

and/or

3. Read pages 70, 71, and 72 in "Text" again.

and/or

4. See your teacher for doing something else that will help you.

When you finish the above, turn to page 13 in L.A.P. 3.

Do the written exercises at the top of page 73 in "Text" and check your answers in "ansbk", page 556.

When you have checked the answers to the two written exercises on page 73 in "Text," turn to page 14 in L.A.P. 3.

If you missed 3 or fewer of the written exercises on page 73 in "Text", you are tremendous. Turn to page 16 in L.A.P. 3 and go! go! go!

If you missed more than 3 of the written exercises on page 73 in "Text", this is not good. Turn to page 15 in L.A.P. 3.

You missed more than 3 of the written exercises on page 73 in "Text", now:

1. Sign up for a small group discussion on written exercises page 73 in "Text."

and/or

2. Ask the teacher for an explanation.

and/or

3. Secure a "Key" from the teacher and go through the step-by-step explanation of the written exercises page 73 in "Text" on page 11 in "Key."

and/or

4. See if you can get a classmate to explain to you your mistakes and straighten you out.

When you finish one or all of the above, move to page 16 in L.A.P. 3.

Only you know when you are ready for page 16 in L.A.P. 3.

Required Activity #3:

You should now:

1. Read and discuss with a classmate section 3-3, page 73 in "Text."

and, if needed

2. Attend a discussion session with the teacher on section 3-3.

When you have done the above, turn to page 17 in L.A.P. 3.

You are now ready to do oral exercises on page 74 and 75 in "Text." You may not want to do all of them so do the odd and check your answers on the green sheet in L.A.P. 3; if you miss more than 3 of the odd, do the even exercises. You may do them any way you like: with a friend, with a small group or by yourself. <u>You</u> know how <u>you</u> learn best.

If you need help, ask the teacher.

When you finish the oral exercises on pages 74 and 75 in "Text," turn to page 18 in L.A.P. 3.

You are now ready to do:

Required Activity #4:

1. Read 3-4, pages 75, 76, and 77 in "Text." You should read this carefully and pay particular attention to the information in the red boxes. You may ask for help or you may want to discuss the information with a classmate.

and, if needed

2. Attend a discussion session with the teacher on 3-4, pages 75, 76, and 77 in the "Text."

When ready turn to page 19 in L.A.P. 3.

You are now ready to solve the oral exercises on page 78 in "Text." Check your answers on the green page_____ in L.A.P. 3.

If you can do the odd oral exercises on page 78 in "Text" with fewer than 3 mistakes you are ready to go to page 20 in L.A.P. 3. (Don't fudge!)

If you "goof" on more than 3 of the odd oral exercises on page 78 in "Text" then do the even e exercises. Remember you can always get help if you have trouble.

When you are ready "Fire" to page 20 in L.A.P. 3.

Turn to page 79 in "Text" and do problems 1 through 34 on written exercises. When you finish check your answers in "ansbk" page 79. When you finish turn to page 21 in L.A.P. 3.

You made 8 or fewer mistakes on the written exercises, page 79 in "Text." You're doing A-OK. Go to page 22 in L.A.P. 3.

You made 9 or more errors on the written exercises page 79 in "Text." Now for some aid:

1. Sign up for a small group discussion.

and/or

2. Secure a "Key" from the teacher and check on page 112 in "Key" for a step-by-step solution of exercises on page 79 in "Text."

and/or

3. See the teacher for an explanation

and/or

4. Try to get a classmate to discuss the exercises on page 79 in "Text" with you.

("Fire") to page 22 in L.A.P. 3, when ready.

You are now ready to do:

Required Activity #5:

1. Read 3-5 on pages 80 and 81 in "Text."

and, if needed

2. Attend a discussion session with the teacher on 3-5, pages 80 and 81 in "Text."

When ready, turn to page 23 in L.A.P. 3.

Study carefully the examples at the top of page 82 in "Text" then do all 24 of the oral exercises on page 82 in "Text." You may use any method you have used in previous L.A.P.'s to do the oral exercises. The answers to oral exercises are on page 38 of L.A.P. 3.

If you have trouble with the oral exercises on page 82 in "Text" then:

1. Sign up for a small group discussion.

and/or

2. Ask the teacher for an explanation.

. . . and then go to page 24 in L.A.P. 3.

Now that you have finished the oral exercises on page 82 in "Text" do all the 30 written exercises on the top of page 83 in "Text." Check your answers in "ansbk", page 556. If you have 5 or fewer mistakes on the 30 problems on page 83 in "Text" you are ready to turn to page 25 in L.A.P. 3.

If you missed more than 5 of the problems on page 83 in "Text" then:

1. Sign up for a small group discussion.

and/or

2. Ask the teacher for help.

and/or

3. Secure a "Key" from the teacher and see the explanation on page 12 in "Key."

When you can do the problems correctly turn to page 25 in L.A.P. 3.

Required Activity #6:

Read and study 3-6 on page 83 in "Text." Pay careful attention to examples. When you finish reading, solve the written exercises 1 through 36 on page 84 and 85 in "Text." Check your answers on page 556 in "ansbk." If you have any trouble you can always get help from teachers. When you finish checking your answers to written exercises on pages 84 through 85 in "Text," turn to page 26 in L.A.P. 3.

You missed 5 or fewer of the exercises on pages 84 and 85 in "Text." That is Great! Turn to page 27 in L.A.P. 3.

What? You missed 6 or more of the exercises on pages 84 and 85 in "Text." This is not good.

Pick out the problems you solved incorrectly and do one or all of the following:

1. Sign up for a small group discussion.

OR

2. Ask the teacher for help.

OR

3. Secure a "Key" and see solutions on page 13 in "Key."

When you know you can solve the problems correctly turn to page 27 in L.A.P.

Required Activity #7:

Read section 3-7 on page 86 in "Text", "Combining Terms and Using Transformation Principles." Read carefully the 4 steps in the grey box on page 86. You need not use these steps in order. This is just a guide.

Study the examples on pages 86, 87, and 88. If you need help ask the Teacher.

When you finish reading page 86 in "Text" and studying the examples on pages 86, 87, and 88 in "Text", turn to page 88 in "Text" and solve the even problems 2 through 50 on pages 88 and 89. Check your answers on page 556 in "ansbk", then turn to page 28 in L.A.P. 3.

You solved the even problems on pages 88 and 89 in "Text" and made 5 or fewer mistakes. You are going strong like "King Kong"; turn to page 29 in L.A.P. 3.

You solved the even problems and missed 6 or more of them. You are now ready to:

1. Ask the teacher for an explanation.

and/or

2. Sign up for a small group discussion.

and/or

3. Get the "Key" and study the solutions on page 14 in "Key."

When you finish and you feel you need more experience on this type of problem, solve the odd exercises on pages 88 and 89 in "Text."

Solving equations is a very big idea in Algebra. Your future progress and success in math will depend on your ability to solve equations. When you know you can solve equations, turn to page 29

You are now ready to apply your ability in solving equations to some problems. Some of the problems are simple and can be solved by means other than equations, but use the equation method for them; it will give you valuable experience and build up your confidence. You will not be able to solve the difficult problems without equations!

A good idea: Right now turn to page 57 in "Text" and review the 4 steps in the grey box on solving a problem. When you finish this, turn to page 30 in L.A.P. 3.

Now that you have reviewed page 57 in "Text," turn to page 89 and 90 in "Text" where you will find 32 written problems. You must solve some of these problems. Try the odd problems and then check your answers on page 556 in "ansbk." When you finish, turn to page 31 in L.A.P. 3.

Ask for help if you need it.

If you solved the odd problems on pages 89 and 90 in "Text" and "bungled" 3 or fewer, you're ready to turn to page 32 in L.A.P. 3.

If you "bungled" more than 3 of the problems on pages 89 and 90 in "Text", you are ready to:

1. Sign up for a small group discussion.

and/or

2. Ask the teacher for help.

and/or

3. Secure a "Key" from the teacher and see the excellent step-by-step explanation on pages 15, 16 and 17 in "Key."

When you are able to solve the written problems turn to page 32 in L.A.P. 3.

Remember! There will be written problems on the Final Test for L.A.P. 3.

Required Activity #8:

Turn to page 91 in "Text" and read section 3-8, "Equations Having the Variable in Both Members." Study the examples carefully. If you need help you can:

1. Sign up for a small group discussion.

OR

2. Ask the teacher for an explanation.

When you are ready, turn to page 33 in L.A.P. 3.

You are now ready to do the oral exercises on page 93 in "Text." Be sure to check your answers on page 38 of the green sheets in the back of L.A.P. 3.

If you can solve the oral exercises, page 93 in "Text" with 4 or fewer mistakes, turn to page 34 in L.A.P. 3.

If you made 5 or more mistakes on the oral exercises on page 93 in "Text" you now:

1. Sign up for a small group discussion.

and/or

2. Ask the teacher for an explanation.

and/or

3. Get a classmate to discuss the oral exercises with you.

When you are ready, turn to page 34 in L.A.P. 3.

Turn to pages 93 and 94 in "Text" and solve all the even written exercises 2 through 44. Check your answers on page 556 in "ansbk."

Now turn to page 35 in L.A.P. 3.

If you had 5 or fewer mistakes on the even exercises on pages 93 and 94 in "Text" you are ready to turn to page 36 in L.A.P. 3.

If you "fouled up" on more than 5 of the even problems on pages 93 and 94 in "Text" then do one or all of the following:

1. Ask the teacher for an explanation.

and/or

2. Sign up for a small group discussion.

and/or

3. Secure a "Key" from the teacher and study the explanation on page 17 and 18.

When you finish the above and if you think the experience will help, do the odd exercises on pages 93 and 94 in "Text." Check your answers on page 556 in "ansbk."

Turn to page 36 in L.A.P. 3.

You are now ready to solve the problems on page 94 and 95 in "Text." Solve problems 1 through 16. Check your answers on page 556 in "ansbk."

You could do this -- solve 1 or 2 problems on pages 94 and 95 in "Text" and check your answers if you are not "making out". Then ask for help. You are reminded to review page 57 in "Text" and the examples on pages 57 through 58.

When you are satisfied you are ready for the Final Test, see the teacher. You may go back and study the chapter test on pages 98, 99, and 100 to check yourself for preparation for the Final Test. The final will be similar to the Chapter test.

ORAL EXERCISES ANSWERS

Page 70

T for transitive
S for symmetric
R for reflexive

1. S
2. T
3. R
4. T
5. a. S
   b. T
6. a. S
   b. T
7. a. S
   b. T
8. a. T
   b. T

Page 72

C = closed
NC = not closed

1. NC; 1+3 = 4, and $4 \notin \{0,1,2,3\}$
2. C; 0x0 = 0, 0x1 =0,
   1x0 = 0, and 1x1 =1
3. C; 1x1 = 1,
4. NC; 2-2 =0 and $0 \notin \{2\}$
5. NC; 0-2 $\neq$ 0 or 2
6. NC; 1/2 $\div$ 2 = 1/4 and $1/4 \notin \{1/2,1,2\}$
7. C; 1 $\div$ 1 = 1, 0 $\div$ 1 = 0
8. NC; result of subtracting any member of set from a smaller element $\notin \{0,1,2,3,4,\ldots\}$
9. C; sum of 2 even numbers is even
10. C; product of 2 odd numbers is odd
11. NC; 1+3 = 4 and $4 \notin \{1,3,5,7,9,\ldots\}$
12. CL sum of any two multiples of 3 is always a multiple of 3
13. C; quotient of any two members of set is always a member of set
14. C; product of 5 and any odd number is odd and $\therefore \in \{1,3,5,\ldots\}$

Page 74

1. Comm. prop. of add.
2. Assoc. prop. of add.
3. Comm. prop. of mult.
4. Assoc. prop. of mult.
5. Assoc. prop. of mult. and subst. principle
6. Comm. of mult.
7. Comm. prop. of Mult.
8. Comm. prop. of add.
9. Assoc. prop. of add. and subst. principle
10. Comm. prop. of add.
11. Assoc. prop. of add.
12. Assoc. prop. of add.
13. Assoc. prop. of add. and subst principle.
14. Assoc. prop. of mult.
15. Assoc. prop. of add.
16. Comm. prop. of mult.
17. Assoc. prop. of mult.
18. Assoc. prop. of mult.
19. Assoc. prop. of mult.
20. Assoc. prop. of mult. and subst. principle
21. a. Comm. prop. of add.
    b. Assoc. prop. of add.
22. a. Comm. prop. of mult.
    b. Assoc. prop. of mult.
23. a. Comm. prop. of add.
    b. Assoc. prop. of add.
24. a. Comm. prop. of mult.
    b. Assoc. prop. of mult.
25. a. Comm. prop. of mult.
    b.Assoc. prop. of mult.
    c. Comm. prop. of mult.
26. a. Comm. prop of add.
    b. Assoc. prop. of add.
    c. Comm. prop. of add.

Page 78

1. Comm. prop. of mult.
   Assoc. prop. of mult.
   Subst. principle
   Mult. prop. of 1
2. Comm. prop. of mult.
   Distrib. prop.
   Subst. principle
   Subst. principle
3. Subst. principle
   Distrib. prop.
   Subst. principle and mult. prop. of 1
   Subst. principle
4. Subst. principle
   Distrib. principle
   Subst. principle
   Subst. principle
5. Comm. prop. of mult.
   Distrib. prop.
   Comm. prop. of mult.

ORAL EXERCISES ANSWERS

Page 78 (cont.)

6. Subst. principle
   Distrib. prop.
   Assoc. prop. of mult.
   and subst. principle
   Subst principle
   Mult. prop. of 1
7. Comm. prop. of add.
   Assoc. prop. of add.
   Mult. prop. of 1
   Distrib. prop.
   Subst. principle
   Mult. prop. of 1
   and distrib. prop.

8. 8x
9. 11a
10. 30s
11. 40y
12. 10x
13. 11n
14. 11m + 7
15. 10y - 3n
16. 5y + n
17. 0
18. 0
19. 2a
20. 3b
21. 11t + 15
22. 19s + 20
23. 4k + 6
24. 3v + 35
25. 6v + 21 + 7m
26. 0
27. 19y + 3
28. 3x + 5y - 6u - 4
29. 4y + 20

Page 82

A = add. S = subtract

1. S 2; x = 4
2. S 5; n = 2
3. A 1; x = 9
4. A 6; y = 13
5. S 7; k = 4
6. S 3/5; r = 4/5
7. A 9; n = 20
8. A 18; h = 24
9. S 2/3; k = 1
10. S 3; m = 0
11. A 40; a = 48
12. A 8; p = 13
13. A.8; n = 1.9
14. A.5; b = 3.7
15. S 4; x = 0
16. S.2; t = .5
17. A 6; 24 = x
18. A 5; 70 = n
19. A 60; 15 = x
20. S 7; 7 = n
21. A 5/7; 1 = w
22. A 3/5; 1 = z
23. S 2/9; 1 = n
24. S 5/11; 12/11 = s

Page 93

A = add. S = sub.

1. Sx; x = 3
2. S2a; a = 8
3. A 2c; c = 3
4. A m; m = 2
5. A y; y = 2
6. S 2r; r = 10
7. S 2x; 1 = x
8. S 2z; z = 1
9. S .5x; x = 5
10. A .1t; t = 4
11. A 9 and S 5x; x = y
12. A 10 and S 3v; v = 10
13. A 7s; S = 1/2
14. 72 = r
15. A 5 and S x; 5/2 = x
16. S 5b; b = 1
17. S 4; a = 5
18. S 2z1; z = 3